a beamsplitter fixed in relation to the primary beam, for dividing primary beam into at least first and second energy beams which follow first and second optical paths;

a tunable solid-state reference laser coupled to the spectrometer through a filter;

at least one return reflector for reflecting the first beam back to the beamsplitter;

at least one radiant energy detector;

a control, data acquisition and processing electronic system;

2. A spectrometer, comprising:

a source of a primary beam of radiant energy;

a beamsplitter fixed in relation to the primary beam, for dividing primary beam into at least first and second energy beams which follow first and second optical paths;

at least one return reflector for reflecting the first beam back to he beamsplitting means;

at least one radiant energy detector;

a control, data acquisition and processing electronic system;

a roof reflector rigidly coupled to the beamsplitter for the purpose of folding the second beam by an angle;

3. A spectrometer, comprising:

a source of a primary beam of radiant energy;

a beamsplitter fixed in relation to the primary beam, for dividing primary beam into at least first and second energy beams which follow first and second optical paths;

at least one return reflector for reflecting the first beam back to the beamsplitting means;

at least one radiant energy detector;

a control, data acquisition and processing electronic system;

at least one flat compensator plate, having parallel faces, which may be scanned by nutation to vary the optical path difference;

4. the spectrometer of claim 1 where the filter is an etalon;

5. the spectrometer of claim 1 where the solid-state laser is a vertical cavity surface emitting laser;

6. the spectrometer of claim 1 where the solid state laser has a

linewidth of less than 1 cm-1;

7. the roof reflector assembly of claim 2 where the assembly is machined by wire EDM;

8. the roof reflector assembly of claim 2 where the assembly is fabricated from ceramic;

9. the roof reflector assembly of claim 2 where the reflective coating is prepared by replication;

10. the spectrometer of claim 3 where a second refractive scanning plate is interposed in the first or second beam;

11. the spectrometer of claim 1 where the signal generated by the diode laser is demodulated;

12. the spectrometer of claim 1 where an additional source of radiant energy is used to probe the transfer functions of the detector or detectors;

13. the spectrometer of claim 1 where the transfer function of the detector is inverted by the use of an adaptive filter;

14. the spectrometer of claim 1 where the radiation detector detects an optically subtracted beam;

15. the spectrometer of claim 1 where the detector signal is modified to correct for nonlinear response using the response to a probe signal;

16. the spectrometer of claim 2 where the detector signal is modified to correct for nonlinear response using the response to a probe signal;

17. the spectrometer of claim 3 where the detector signal is modified to correct for nonlinear response using the response to a probe signal.